

Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand.

Albert Einstein (1879 - 1955)





Gliding Experiments of the Wright Brothers

The Wrights and Flight Research

1899-1908

Al Bowers

Jennifer Hansen Cole

Cam Martin

NASA Dryden Flight Research Center

I believe that flight is possible...

Wilbur Wright, 03 Sep 1900

Background: The Times

Transcontinental Railroad...



- the great engineering achievement of the time
- understanding of “two-track” vehicle systems (buggys, carts, & trains)
- completed on 10 May 1869 (Wilbur was two years old)

Background: Progenitors

- Otto Lilienthal
 - experiments from 1891 to 1896
- Samuel P Langley
 - experiments from 1891-1903
- Octave Chanute
 - experiments from 1896-1903

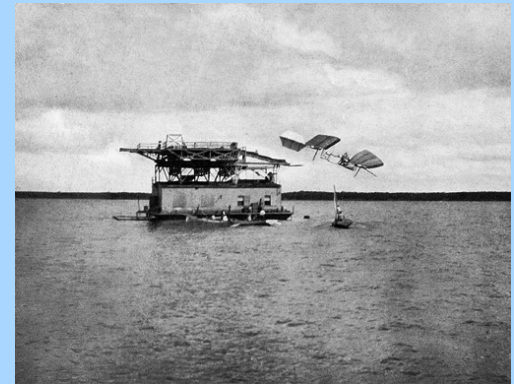
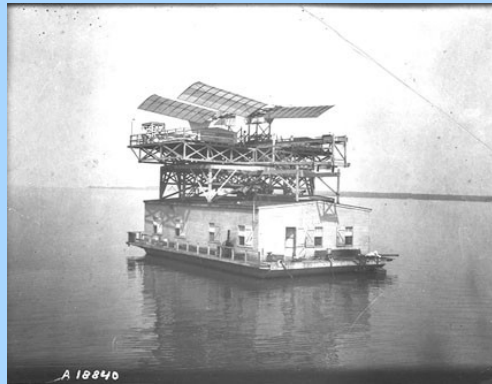
Otto Lilienthal

- Glider experiments 1891 - 1896



Dr Samuel Pierpont Langley

- Aerodrome experiments 1887-1903

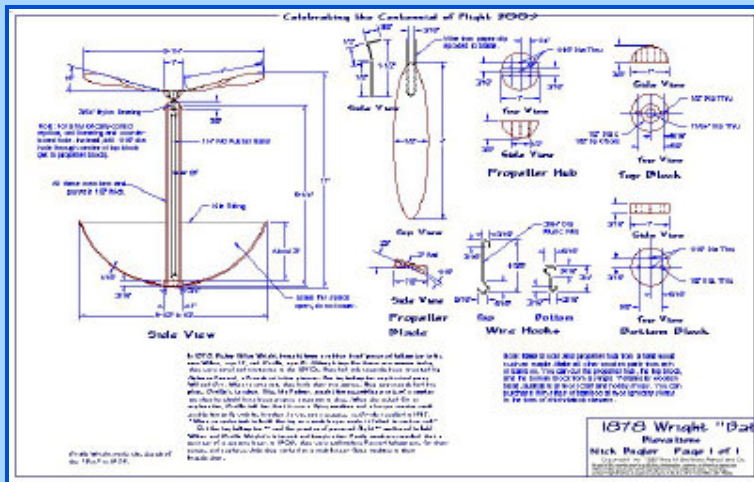
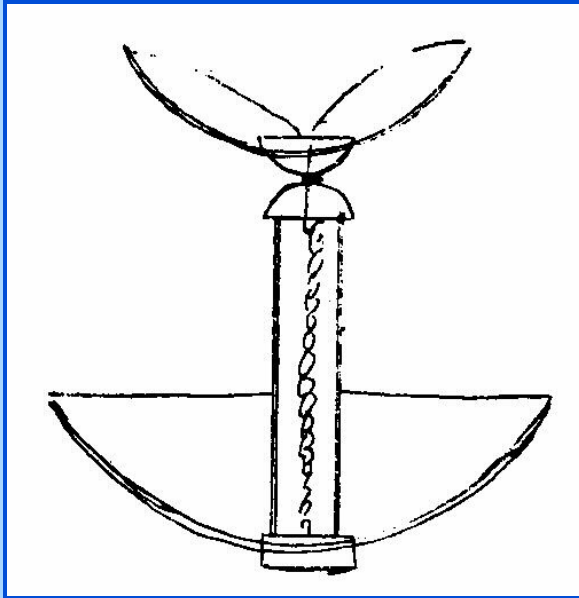


Octave Chanute

- Gliding experiments 1896 to 1903



Inspiration: 1878



Wright Brothers' Paper

WEST SIDE NEWS.

Vol. 1. DAYTON, OHIO, JULY 20, 1888 No. 15

<p style="text-align: center;">West Side News.</p> <p style="text-align: center;">PUBLISHED WEEKLY.</p> <p>Vilbur Wright Editor Orville Wright Publisher</p> <p>TERMS:—Quarter of year, twenty cents a year, ten cents.</p> <p style="text-align: center;">1210 WEST THIRD STREET, DAYTON, OHIO.</p> <p style="text-align: center;">Racing a Bird's Nest.</p> <p>Edward Corlies, the inventor of the Corlies engine, in building an addition to his factory, while laying the foundation found it necessary to remove a ledge by blasting. The workmen had been employed, the materials provided, and the blasting begun. The next morning Mr. Corlies passed by the place where work was pro-</p>	<p>gressed out of the way, but with a genuine interest in their growth. The old birds had all the time they wanted; and when at last they had steadily helped the clumsy, reluctant youngsters over the edge of the nest, and they showed themselves able to get about on their own hook, orders were given to resume the building operations; and the dull team of the propounder tearing the rocks apart was heard where the birds had perched.—<i>Boston Times-Citizen.</i></p> <p style="text-align: center;">"Dot Bargain."</p> <p>A little colored boy, and over-est-illigant but full of soul, called at a house and requested the privilege of removing three barrels of rubbish for the sum of twenty cents. The request was granted, and the next morning the young African appeared with two com-</p>	<p>pany is more interesting to the young people than an adventure of Isaac and Metcalf, one of the first settlers of the town. Metcalf, a young man named Webster, and James Richards were out one day on a moose hunt. The only gun was carried by Richards; the two others went armed with a hatchet each.</p> <p>As the company divided, Richards kept to the base of Mt. Battie, while the others ascended it and kept the same course. Mr. Richards' two dogs had scented up an old bear on the western slope of the mountain, and, after shooting it, Mr. Richards went in search of his companions to assist them of his carcass.</p> <p>In the meantime, Metcalf and Webster had found the lake, where the two ribs, of considerable size, were secured. They tried to drive them out of the den, by building</p>	<p style="text-align: center;">F. M. NIPGEN, DEALER IN DRUGS, MEDICINES <i>Physician's prescriptions carefully compounded.</i> R. W. Cor. Fifth and Williams</p> <hr/> <p style="text-align: center;">NEW DRUG STORE. WM. P. GRAYBIL <i>dealer in</i> Drugs, medicines, etc. Prescriptions carefully compounded. S. E. Cor. Third and Sumner</p> <hr/> <p style="text-align: center;">J. W. COATES, DEALER IN DRUGS, MEDICINES, AND CHEMICALS <i>Physician's Prescriptions carefully compounded.</i> 1113 West Third St.</p>
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Dayton's "West Side News"

Wright Brothers' Cycle Company

- “single-track” vehicle mechanics

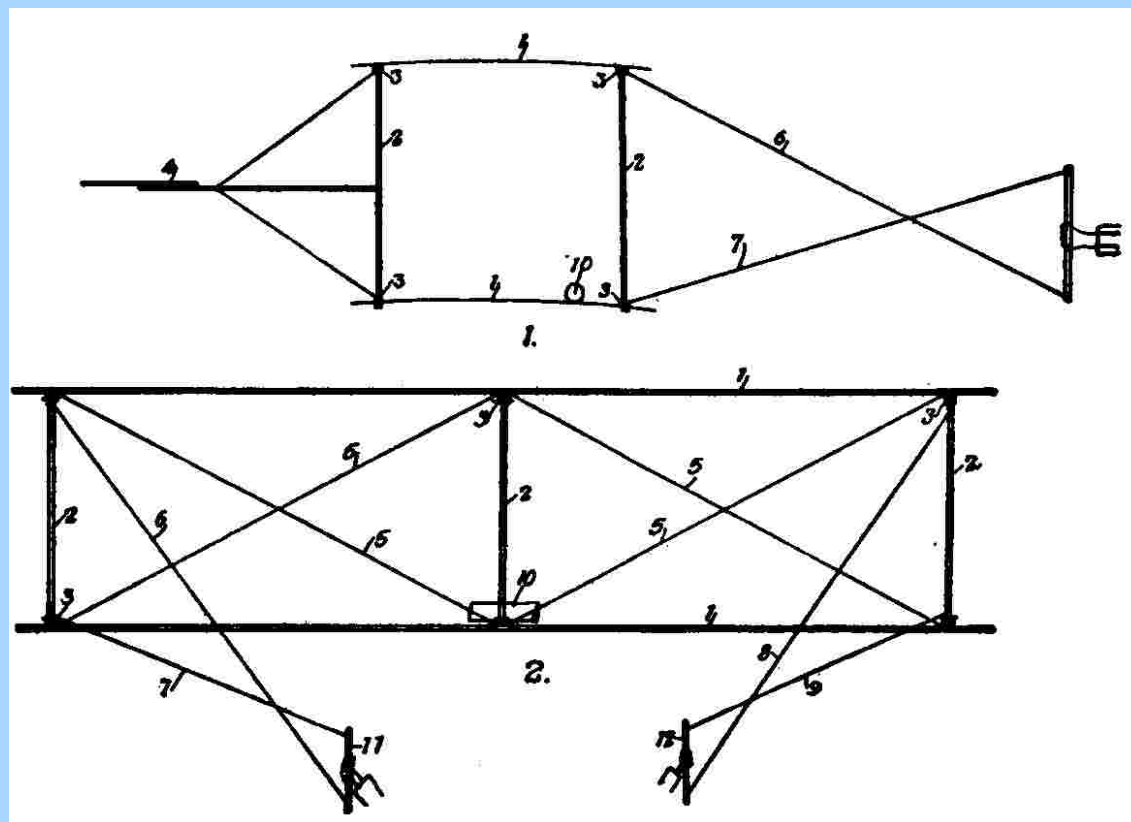
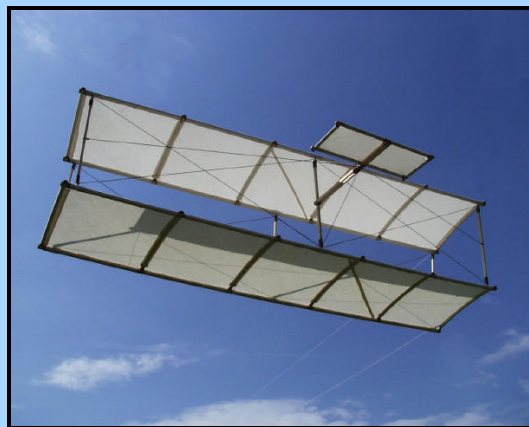


Inspiration: July 1899



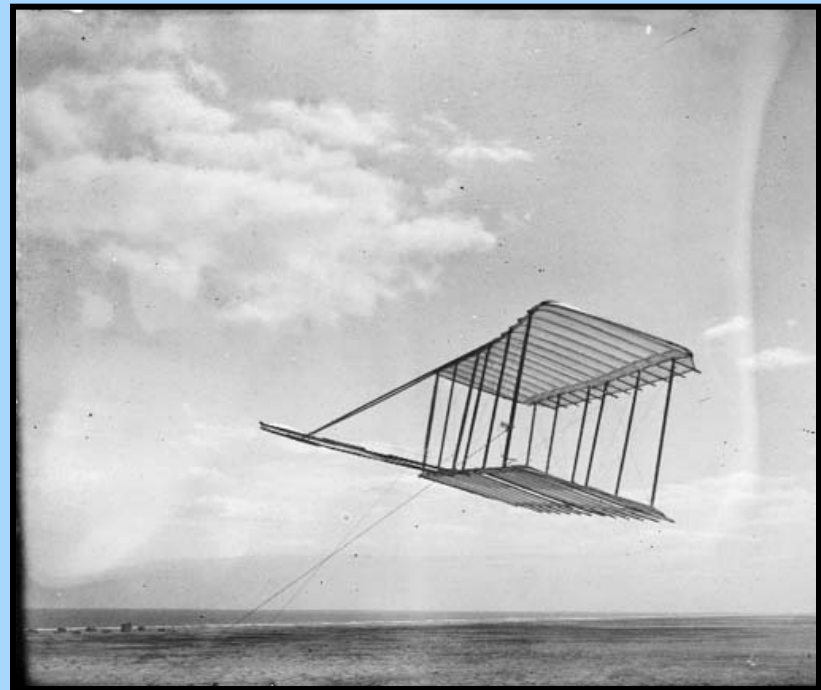
1899 Kite Experiments

Dayton Ohio



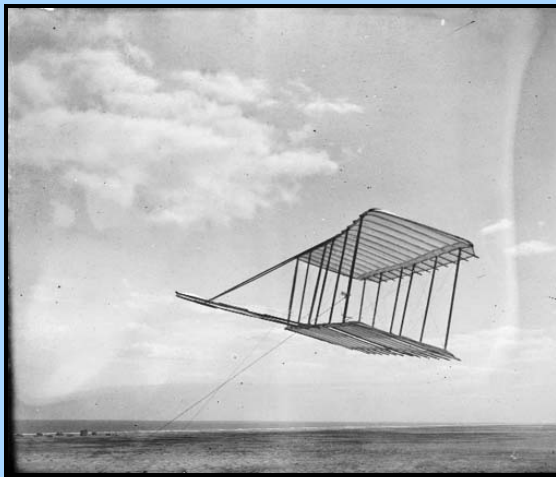
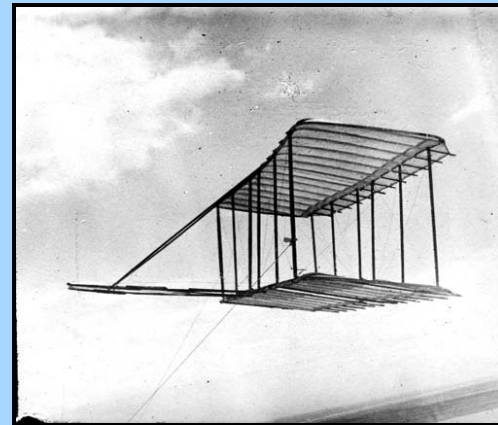
1900 Wright Glider

- Span: 17 feet
- Chord: 5 feet
- Gap: 4 feet, 8 inches
- Camber: $\frac{1}{23}$
- Wing Area: 165 sq ft
- Weight with operator
190 lb



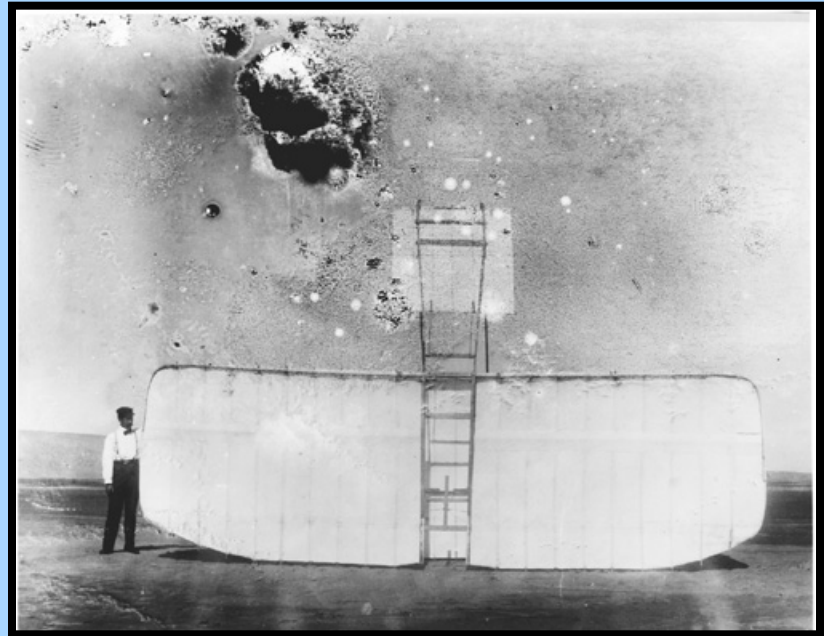
1900 Wright Glider

Kitty Hawk September - October 1900

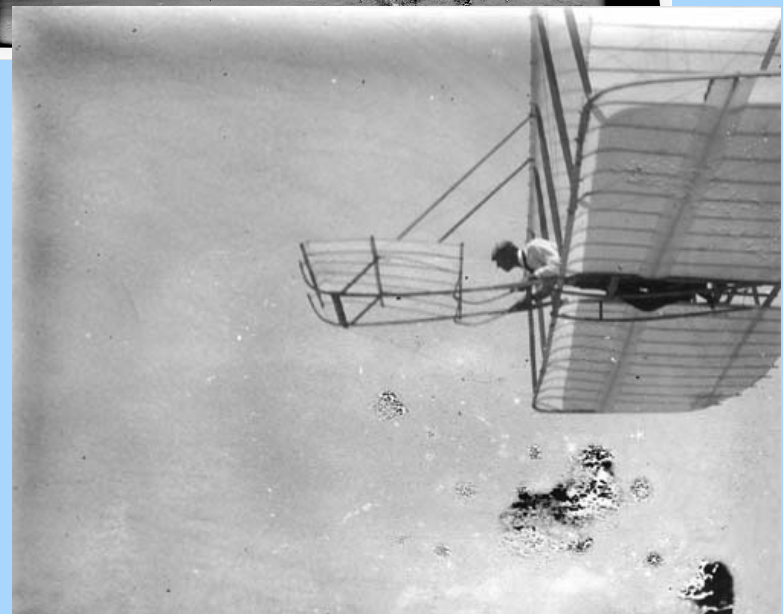
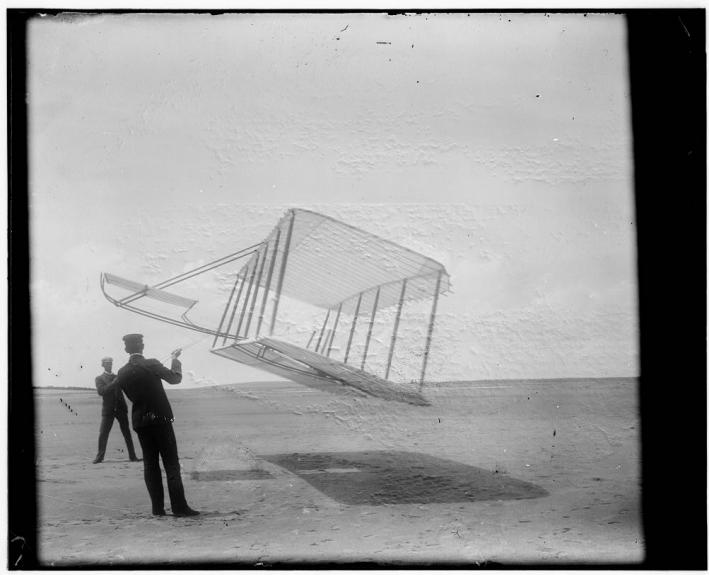


1901 Wright Glider

- Span: 22 feet
- Chord: 7 feet
- Gap: 4 feet, 8 inches
- Camber: $1/17$
- Wing Area: 290 sq ft
- Horizontal Rudder Area
18 sq ft
- Length 14 feet
- Weight 98 lb



1901 Glider

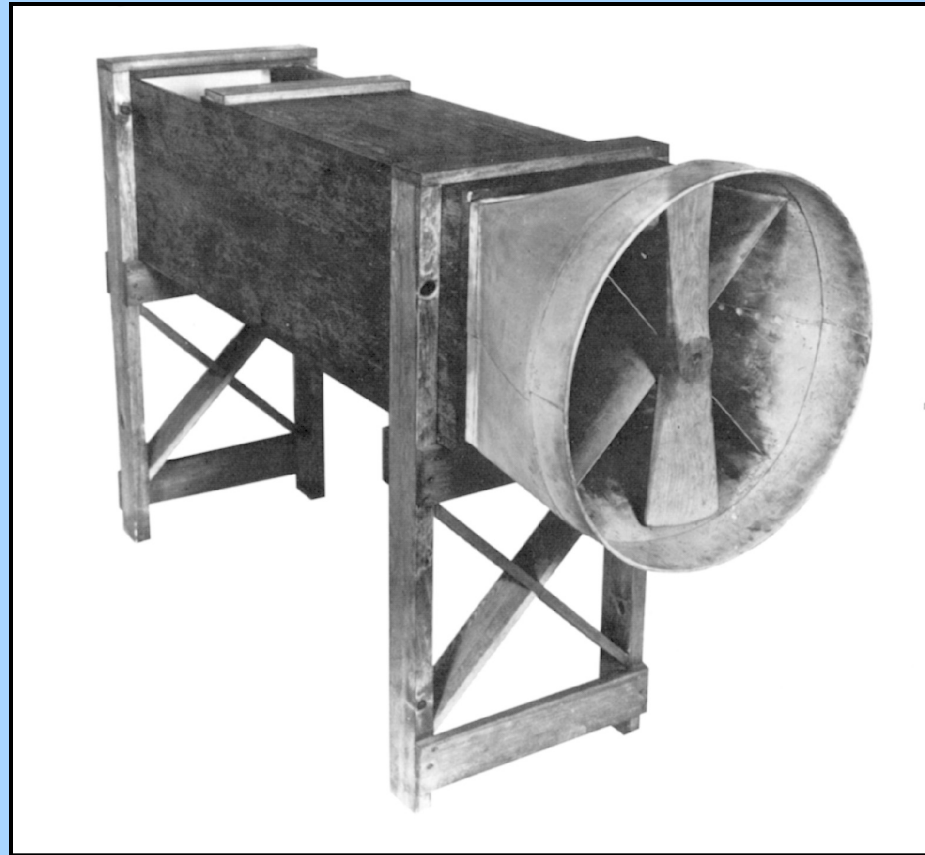


They go home, very discouraged.

**On the train back to Dayton,
Wilbur tells Orville that men would
not fly for another fifty years...**

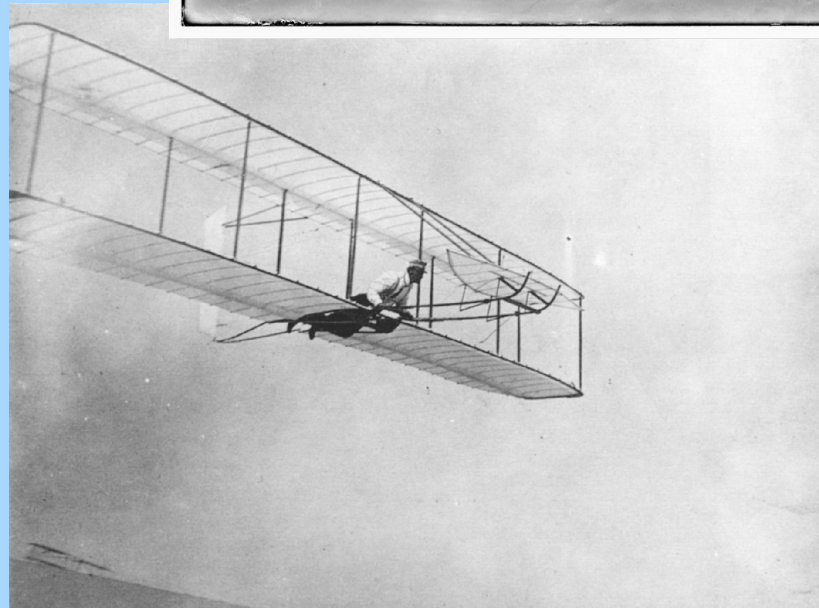
1901 Wind Tunnel

16 inch square section x 6 feet



1902 Wright Glider

- Span: 32 feet 1 inch
- Chord: 5 feet
- Gap: 4 feet, 7 inches
- Camber $1/24$
- Wing Area: 305 sq ft
- Horizontal Rudder Area 15 sq ft
- Length 16 feet 1 inch
- Weight 112 lb
- Three configurations

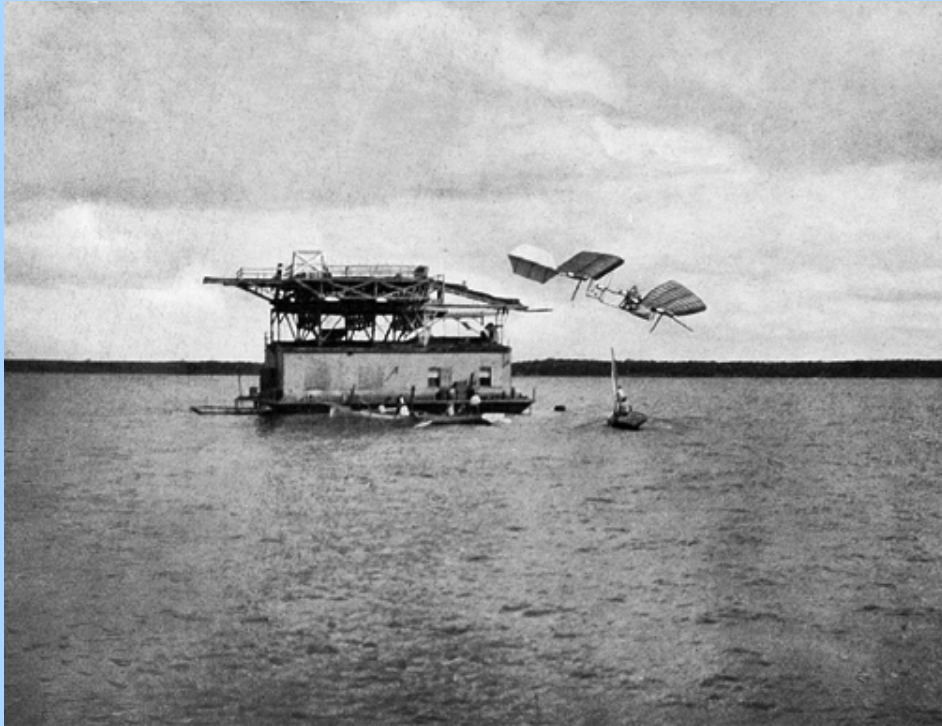


Centennial of Controlled Flight

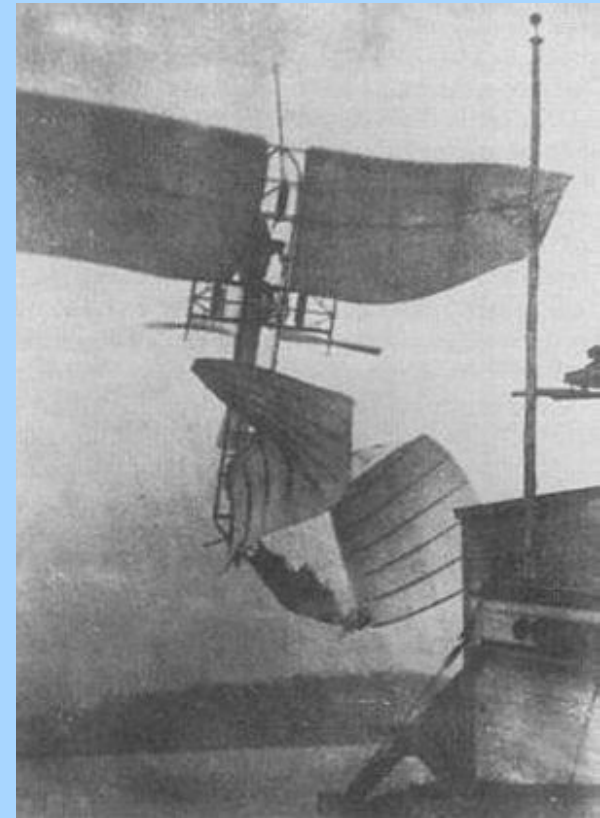
24 October 1902



1903 Langley Aerodrome



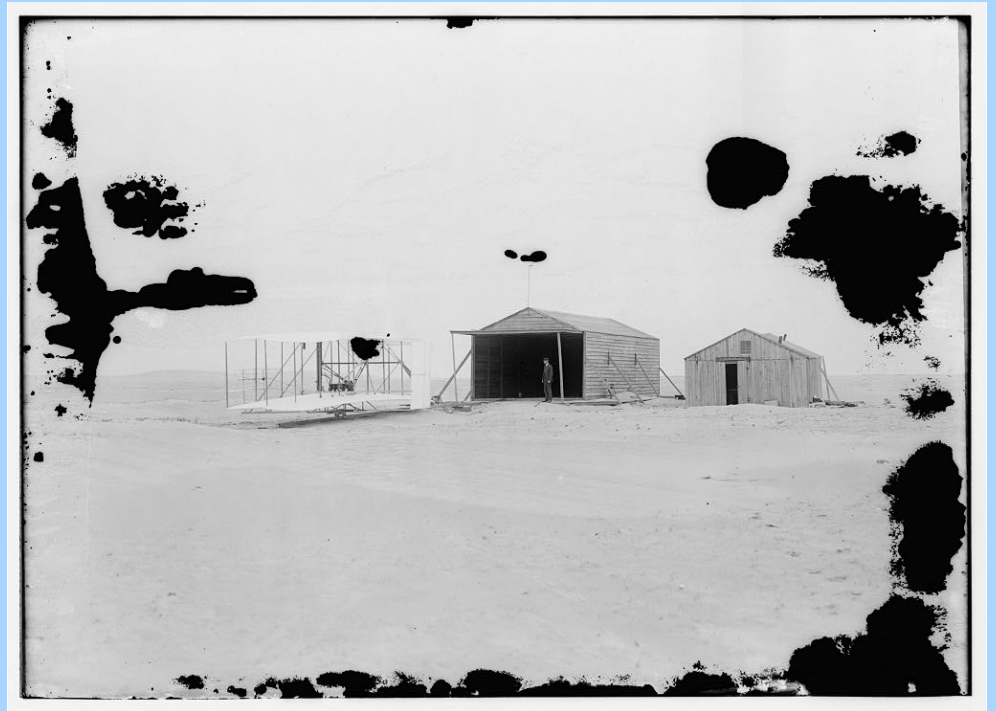
Oct 7, 1903



Dec 8, 1903

1903 Wright Flyer

- Span: 40 feet 4 inch
- Chord: 6 feet 6 inches
- Gap: 6 feet 2 inches
- Camber $\frac{1}{20}$
- Wing Area: 510 sq ft
- Horizontal Rudder Area 48 sq ft
- Vertical Rudder 21 sq ft
- Length 21 feet 1 inch
- Weight 605 lb



1903 Wright Flyer

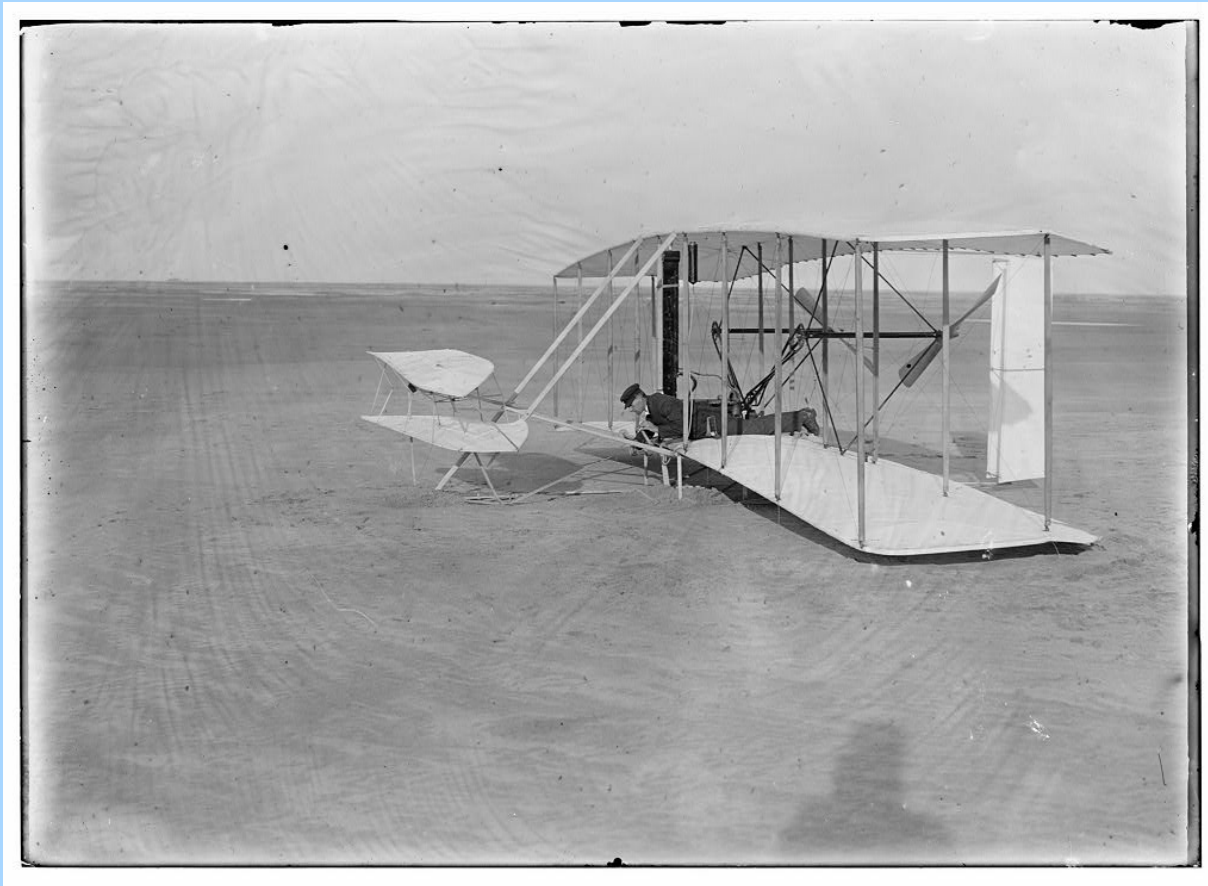
December 14, 1903



Wilbur wins the coin toss, and...

1903 Wright Flyer

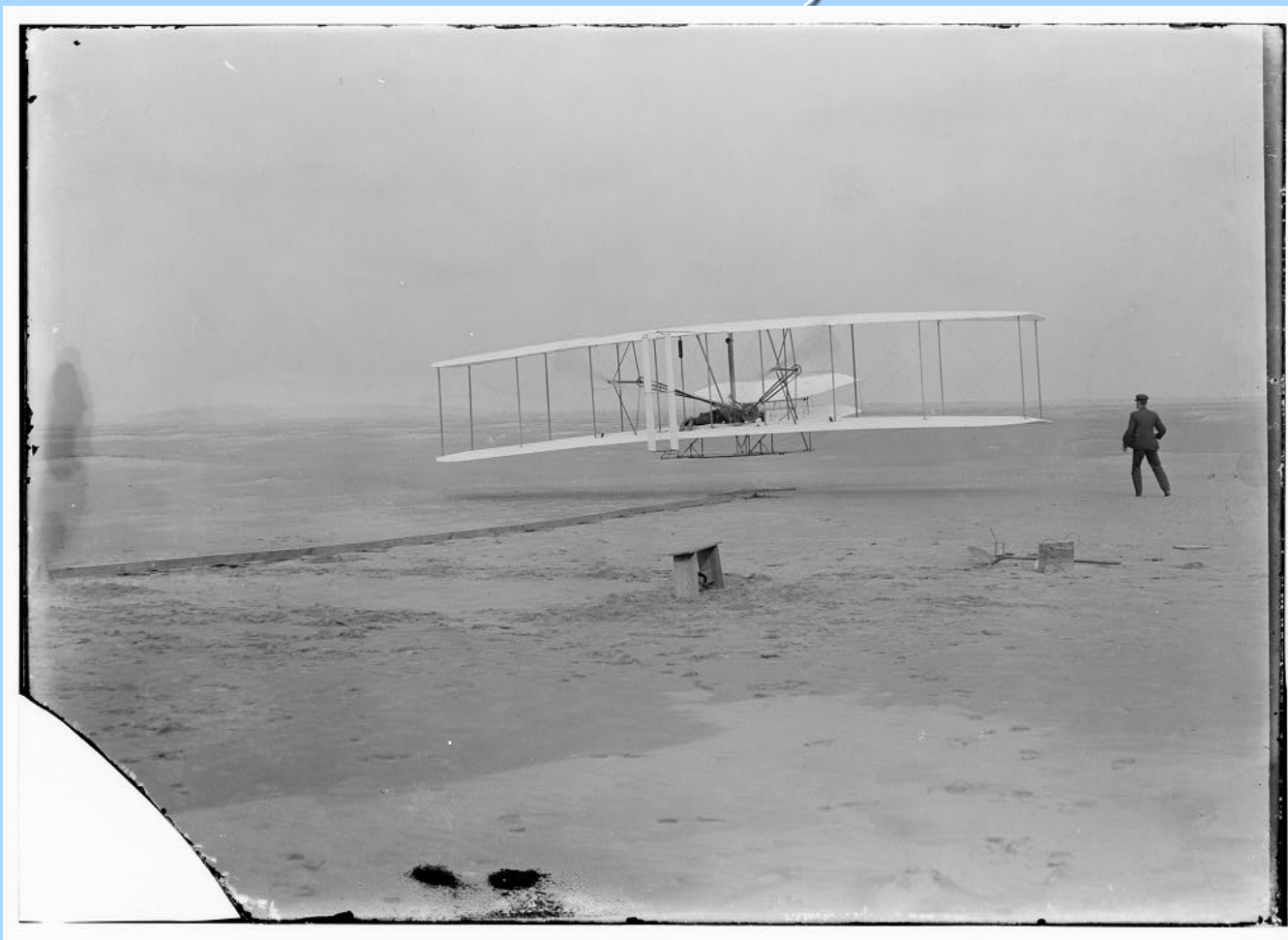
December 14, 1903



Oops!

1903 Wright Flyer

December 17, 1903



1903 Wright Flyer



They tell the world...

Form No. 168.

THE WESTERN UNION TELEGRAPH COMPANY.

INCORPORATED
23,000 OFFICES IN AMERICA. CABLE SERVICE TO ALL THE WORLD.

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This is an UNREPEATED MESSAGE, and is delivered by request of the sender, under the conditions named above.
ROBERT C. CLOWRY, President and General Manager.

RECEIVED at

170

176 C KA GS 33 Paid. Via Norfolk Va

Kitty Hawk N C Dec 17

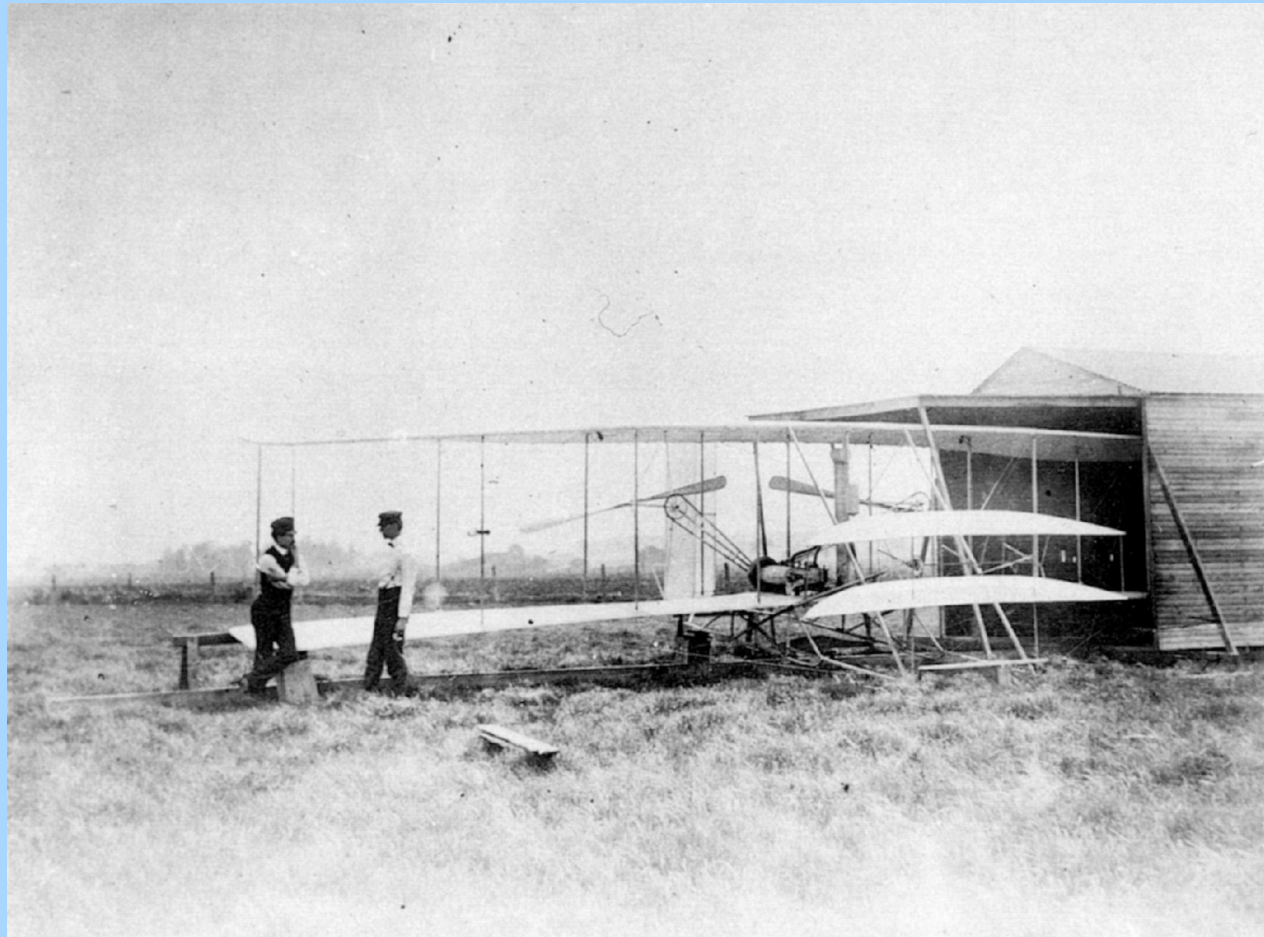
Bishop M Wright

7 Hawthorne St

Success four flights thursday morning all against twenty one mile
wind started from Level with engine power alone average speed
through air thirty one miles longest 57 seconds inform Press
home ~~####~~ Christmas . Orevelle Wright 525P

1904 Huffman Prairie Ohio

September 20, 1904 First Complete Circle in an Airplane



1904 Huffman Prairie Ohio

September 20, 1904 First Complete Circle in an Airplane



1905 Huffman Prairie OH

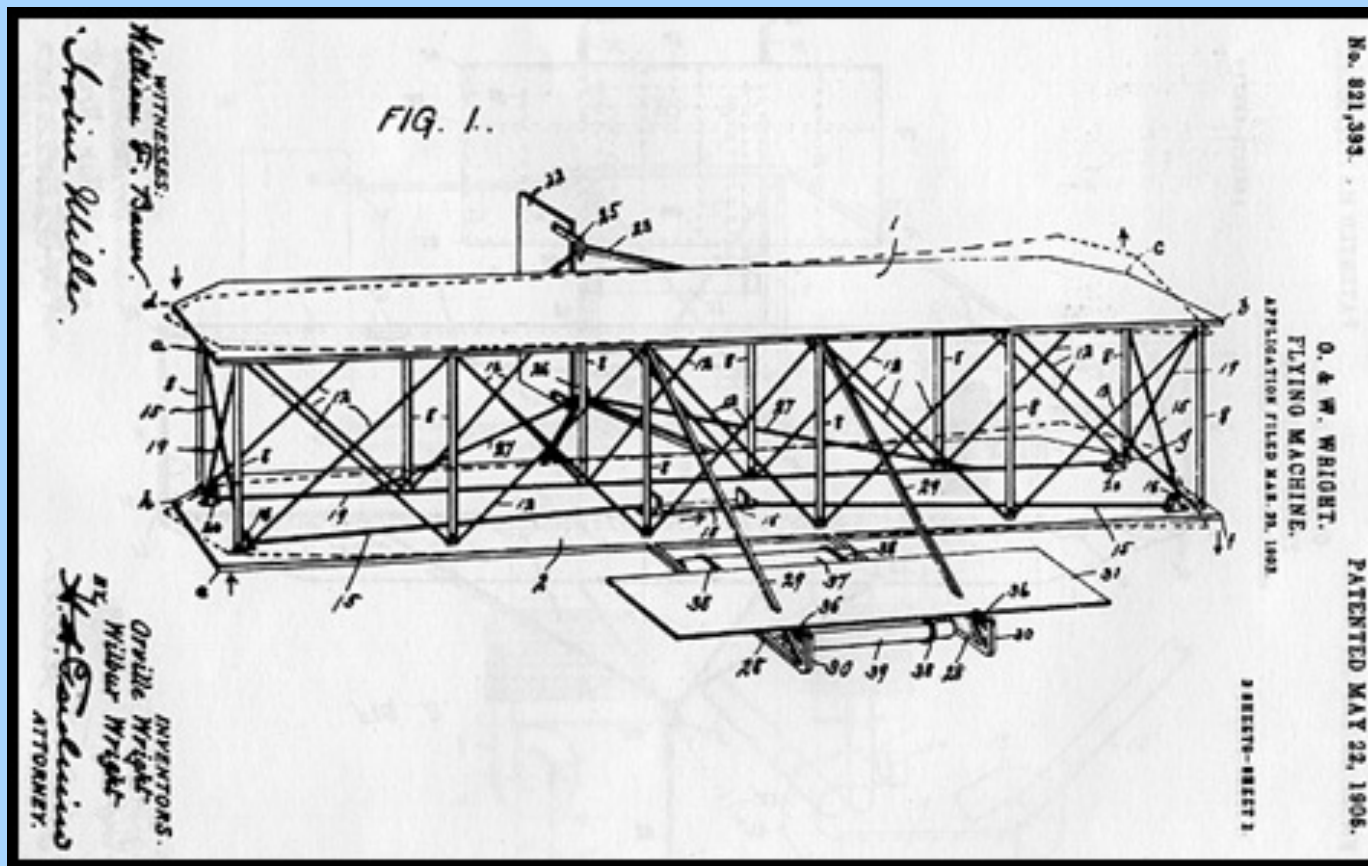
Oct 4, 1905 Extended Flight in an Airplane (38 minutes)



Wright Flying Machine Patent

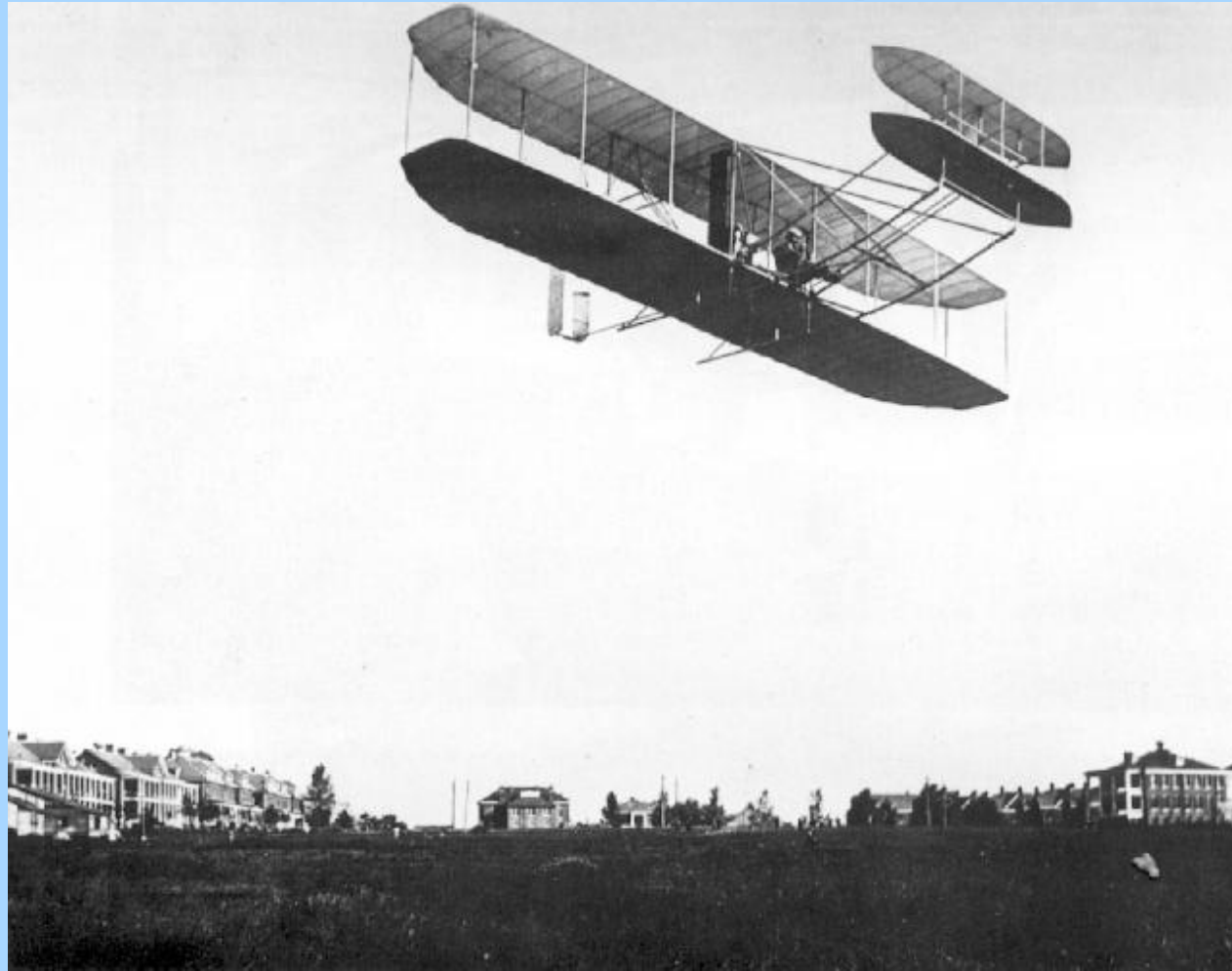
#821,393

May 22, 1906



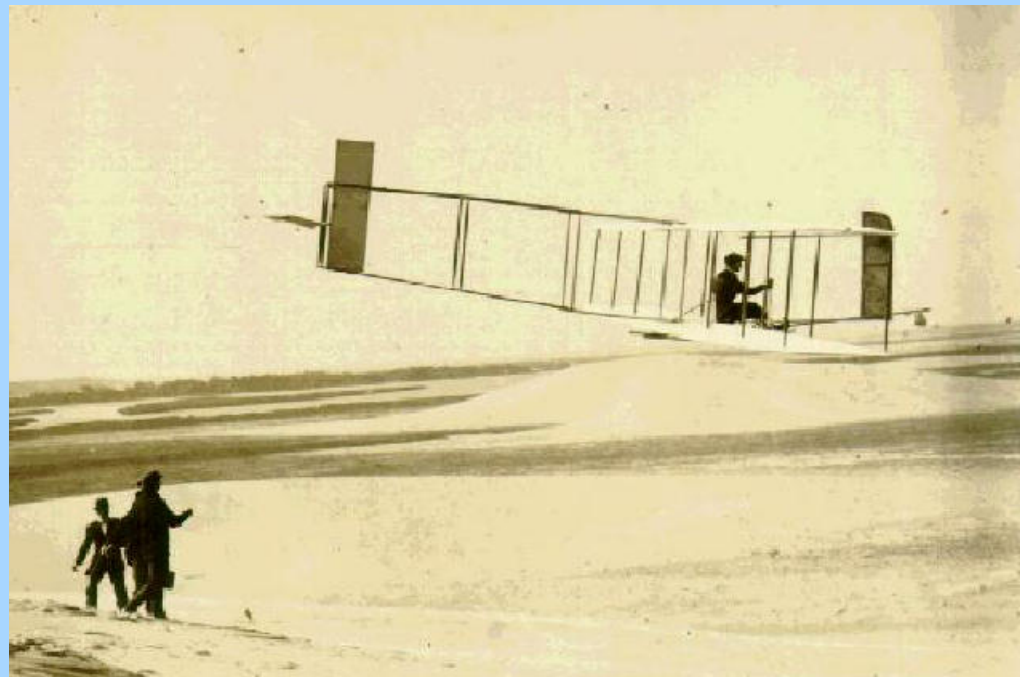
1908-1909 France & Virginia

Public trials of the first practical airplane



1911 Wright Glider

- Built for autopilot experiments
- Set duration record (9 min 45 sec)



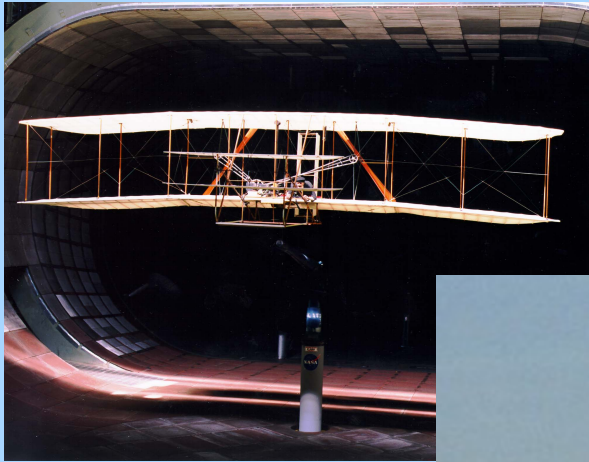
The Rest is History...



NACA Board, 1938

Orville serves on NACA board from 1920 to 1948

Understanding the Wright's Accomplishments Through Evaluation



Wright Flyers Today



1903 Wright Flyer I
National Air & Space Museum



1905 Wright Flyer III
Carillon Hall

Wilbur and Orville

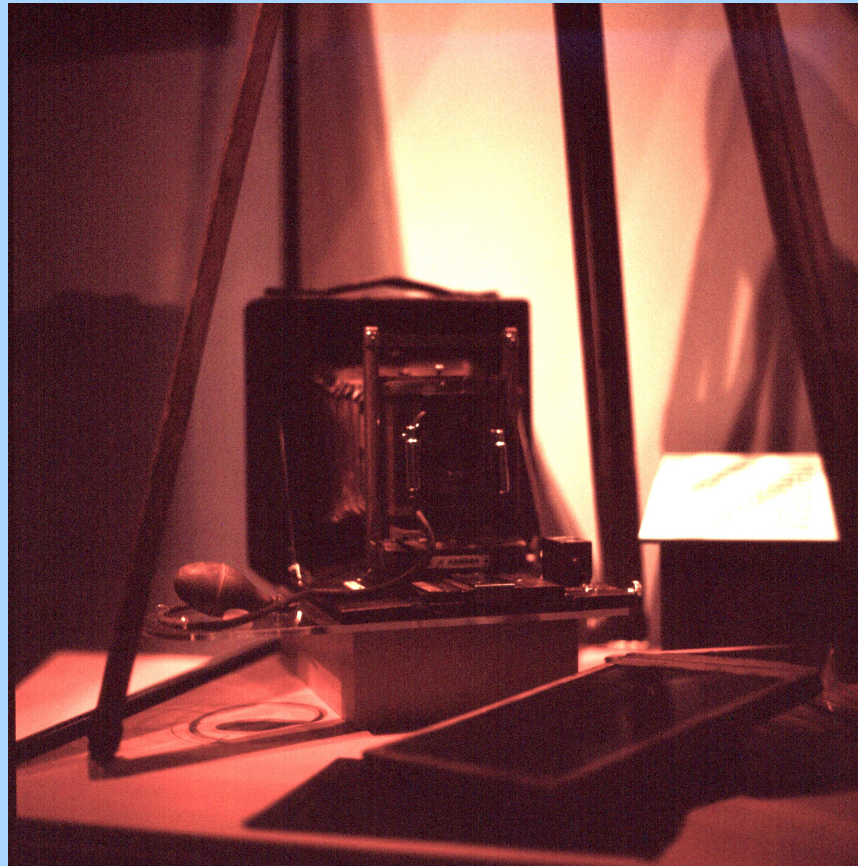


16 Apr 1867 – 30 May 1912

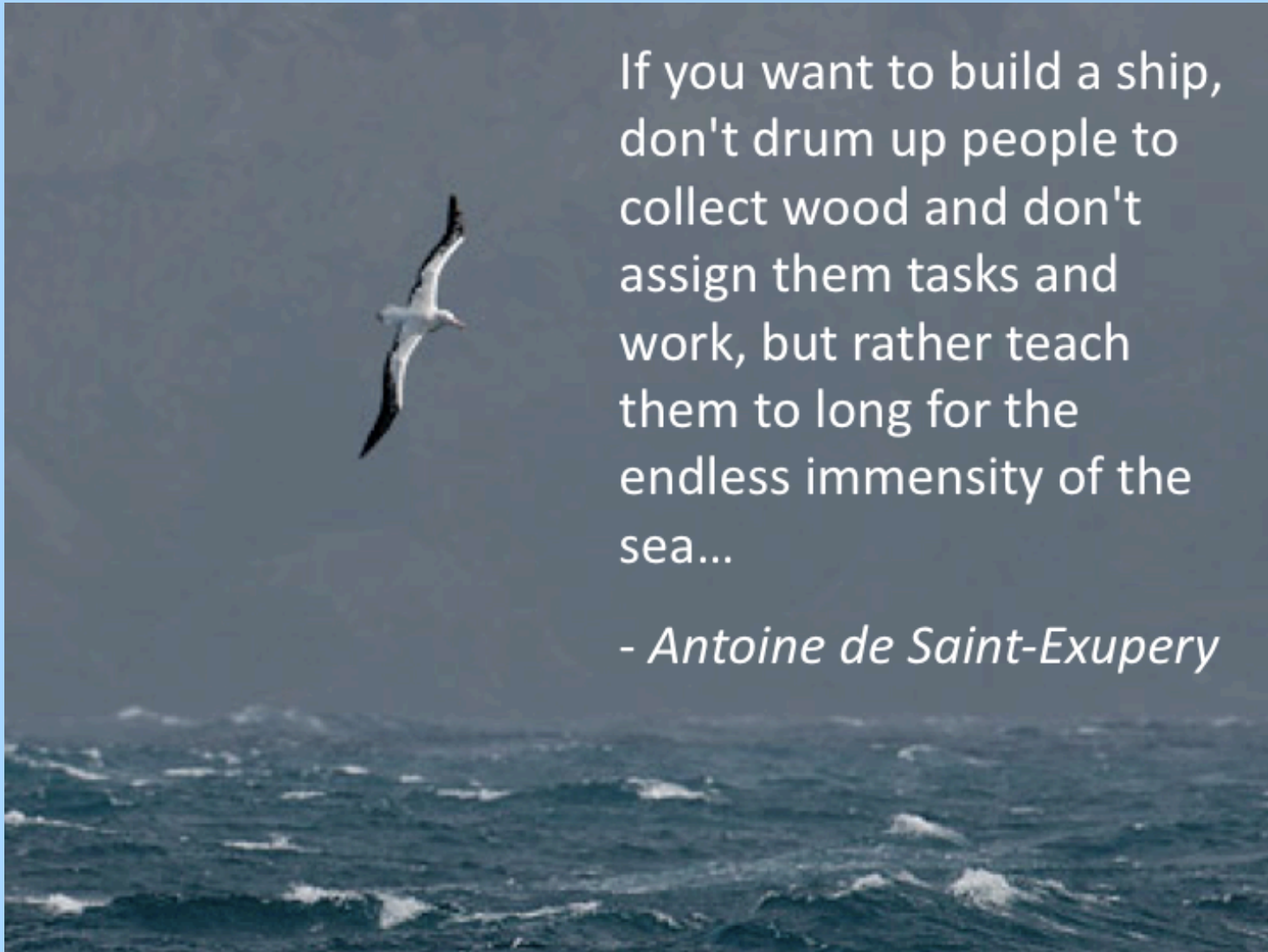


19 Aug 1871 – 30 Jan 1948

Orville's Camera: 1902 to 1905



What do we believe is possible?



If you want to build a ship,
don't drum up people to
collect wood and don't
assign them tasks and
work, but rather teach
them to long for the
endless immensity of the
sea...

- *Antoine de Saint-Exupery*